WELSH JOINT EDUCATION COMMITTEE
General Certificate of Education
Advanced Subsidiary/Advanced

CYD-BWYLLGOR ADDYSG CYMRU
Tystysgrif Addysg Gyffredinol
Uwch Gyfrannol/Uwch

311/01

BIOLOGY (MODULAR)

MODULE BI1

P.M. WEDNESDAY, 10 January 2001

(1 hour 40 minutes)

For Examiner's Use Only

Total Marks	

Centre Number .....

Candidate's Name (in full) .....

Candidate's Examination Number .....

INSTRUCTIONS TO CANDIDATES

Write your centre number, name and candidate number in the spaces provided above.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The quality of written communication will affect the awarding of marks.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

1. The following list shows some chemical compounds found in living organisms.

Match the appropriate letter to one of the following descriptions.

Use each letter once only.

A Glucose, B Cellulose, C Lipid, D Protein, E Starch.

(i) is destroyed by heating to 65°C .....

(ii) has a storage function in plants .....

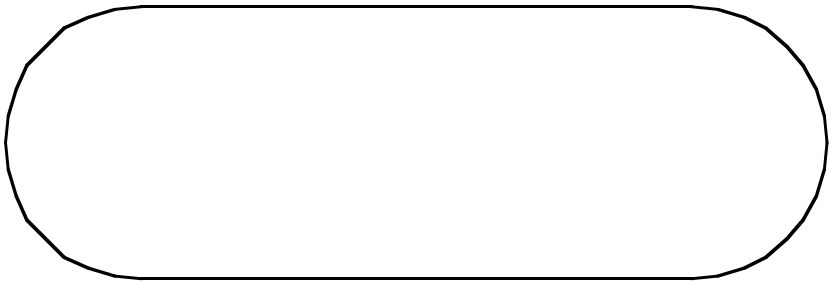
(iii) is soluble in water .....

(iv) has a support function in plants .....

(v) does not mix with water .....

(Total 5 marks)

2. *(a)* Complete the diagram of a mitochondrion and **label four** structures **clearly**. [5]



(b) (i) What process takes place in the mitochondrion? [1]

.....

(ii) Name a tissue where you would expect to find large numbers of mitochondria. [1]

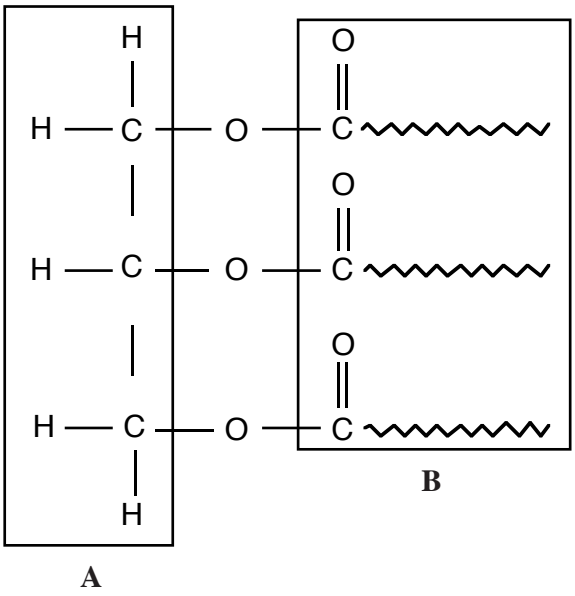
.....

(iii) Explain why mitochondria are particularly important **in this tissue**. [1]

.....

(Total 8 marks)

3. The diagram below shows the structure of a lipid (triglyceride) molecule.



(a) Name the parts **A** and **B**. [2]

A .....

B .....

(b) (i) What type of chemical reaction takes place to form the bonds between **A** and **B**? [1]

.....

(ii) What is the other product of this reaction besides the lipid molecule? [1]

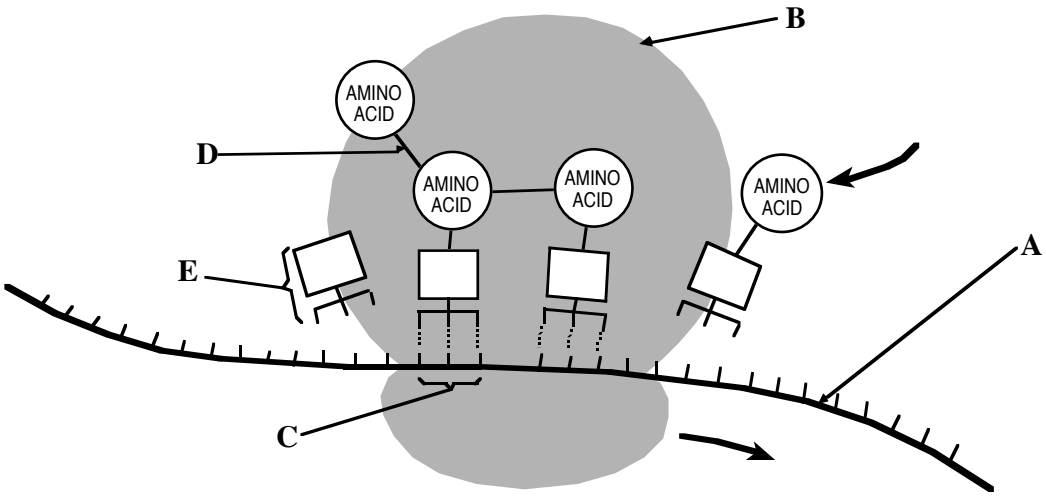
.....

(c) State **one** function of this type of lipid in living organisms. [1]

.....

(Total 5 marks)

4. The following diagram shows a stage of protein synthesis.



(a) (i) What name is given to the stage of protein synthesis shown in the diagram? [1]

.....

(ii) Identify [5]

A .....

B .....

C .....

D .....

E .....

(b) What will happen to **E** now that the amino acid it was carrying has been added to the growing polypeptide chain? [2]

.....

.....

.....

(c) State **precisely** where in the cell

(i) **A** was produced [1]

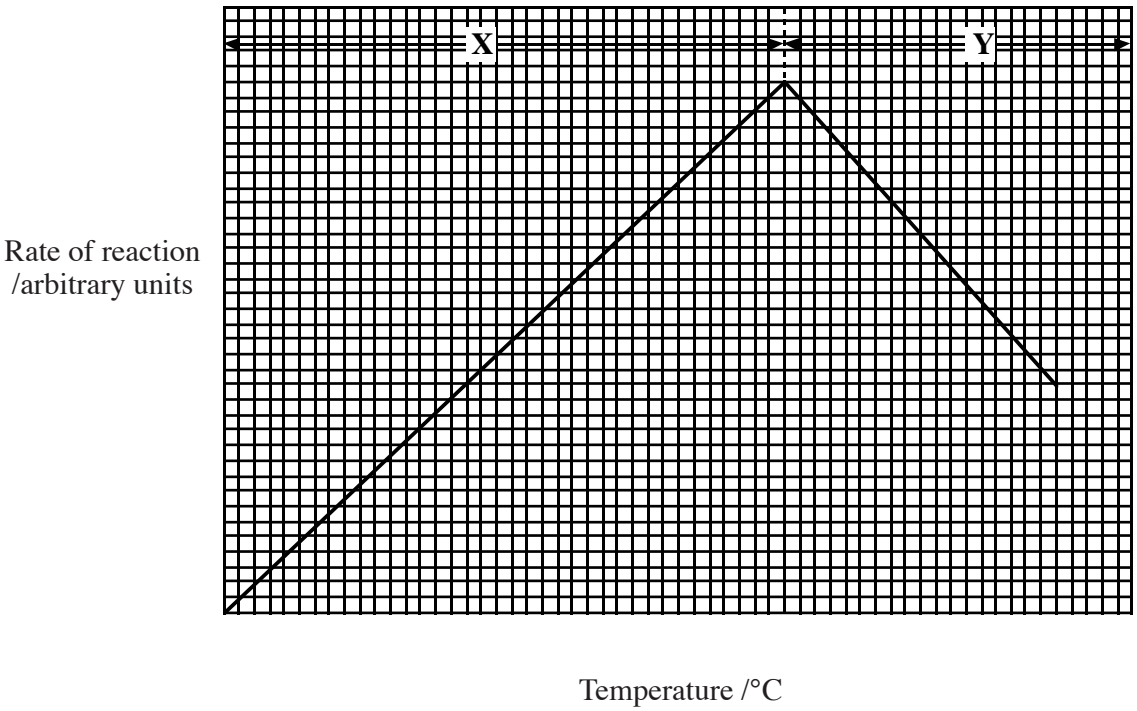
.....

(ii) **B** was produced. [1]

.....

(Total 10 marks)

5. The graph below shows the results from a number of experiments to determine the effect of temperature on the rate of a reaction catalysed by a mammalian enzyme.



(a) Add the scale and numbers on the temperature axis for a typical mammalian enzyme. [3]

(b) (i) Explain the shape of the curve in region **X**. [2]

.....

.....

(ii) Explain the shape of the curve in region **Y**. [3]

.....

.....

.....

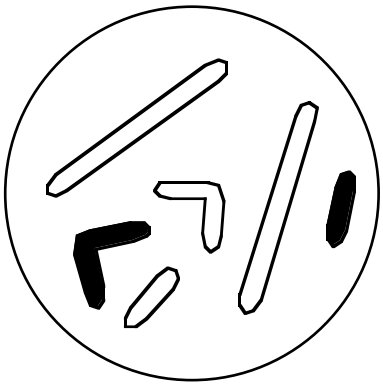
(c) If you were carrying out this experiment state **two** factors which you would need to keep constant in order to obtain reliable results. [2]

.....

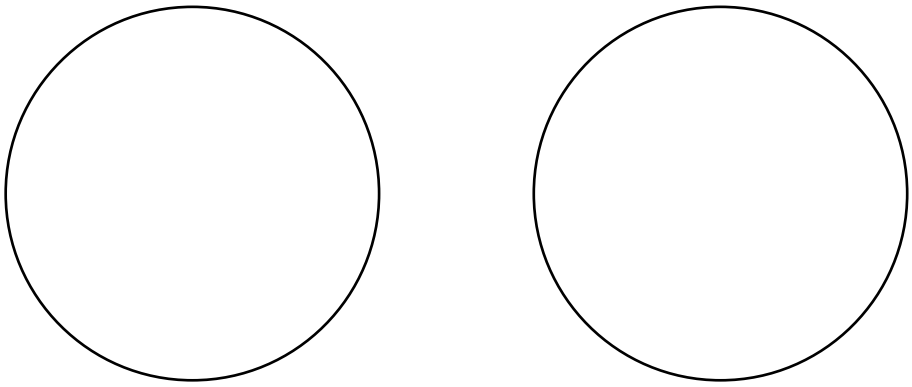
.....

(Total 10 marks)

6. The diagram below shows a diagram of a nucleus from a cell.



(a) Complete the diagrams to show the two nuclei which would be formed if the cell divided by **mitosis**. [1]



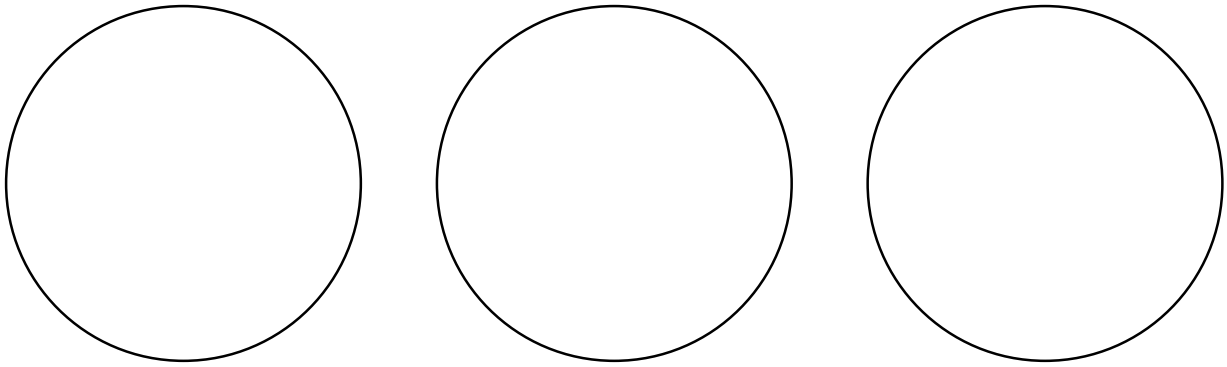
(b) (i) Give one example of a major site of **mitosis** in a plant. [1]

.....

(ii) Give an example of a site of **meiosis** in a plant. [1]

.....

(c) Complete the diagrams to show **three** different nuclei which could be formed if the cell divided by **meiosis**. (Assume that no crossing over has taken place). [3]



(d) (i) What is the stage between successive cell divisions called? [1]

.....

(ii) State **three** processes which must occur during this stage to prepare the cell for division. [3]

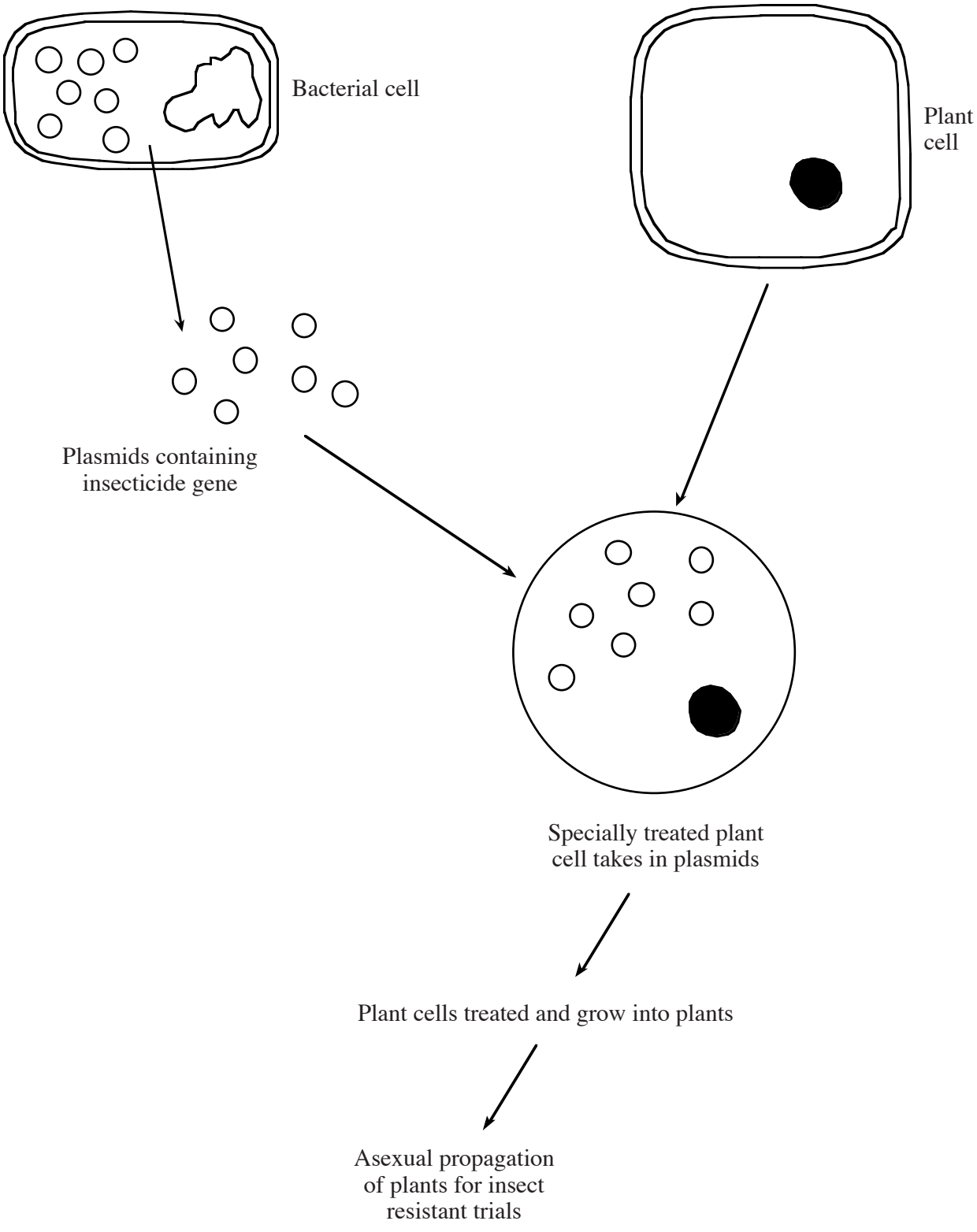
.....

.....

.....

(Total 10 marks)

7. The bacterium *Bacillus thuringiensis* has a gene on its plasmid coding for the production of a protein toxic to many insect pests. The bacterial cell can be made to synthesise copies of these plasmids which can be introduced into tomato cells as shown below. Tomato plants grown from these cells are resistant to a wide range of insect pests.



(a) (i) Name the chemical which makes up the bacterial plasmid. [1]

.....

(ii) What structure has been removed from the treated plant cell in stage 2 which would otherwise prevent uptake of the plasmid? [1]

.....

(iii) Why is it important that the entire process only involves asexual reproduction? [1]

.....

.....

.....

(iv) Suggest the **two** main advantages to farming of introducing a gene for this toxic protein into the plant. [2]

.....

.....

(b) What important factor would need to be determined so that genetically engineered tomatoes could be grown commercially? [1]

.....

.....

.....

(Total 6 marks)

8. An experiment was carried out in which strips of red onion epidermal cells were immersed in a series of sucrose solutions. The results are shown in the table below.

Molarity of sucrose solution (M)	*% plasmolysed cells*
0.00	0
0.20	2
0.40	13
0.45	25
0.50	75
0.55	88
0.60	95
0.80	100

(a) (i) Draw a graph on the opposite page using the data above. [4]

(ii) Using the graph, what is the solute potential (Ψ_s) value in sucrose molarity for the red onion cells? ..... [1]

(iii) Explain how you have arrived at this answer. [1]

.....

.....

(b) Draw and label a plasmolysed red onion cell as you would see it under the microscope. [3]

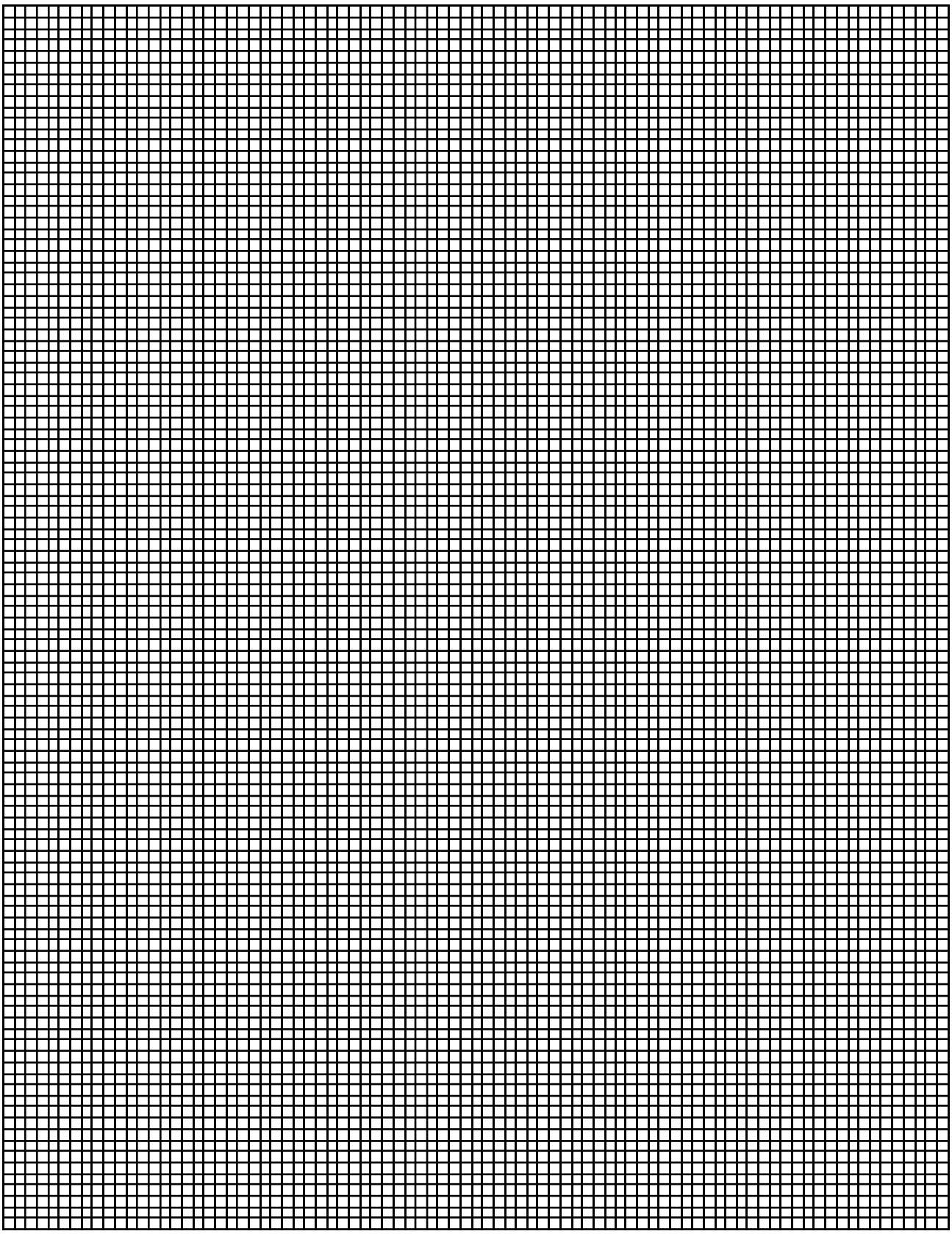
(c) How could the cells which were in 0.8 M sucrose be returned to a turgid condition? Explain your answer. [2]

.....

.....

.....

(Total 11 marks)



Answer the questions on page 10.

9. Either,

(a) Give an **illustrated** account of the detailed structure and functions of the plasma membrane. [10]

Or,

(b) Give an account of DNA replication. [3]

Explain how evidence from experimental work led to the semi-conservative theory of DNA replication. [7]

(Total 10 marks)